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Scallop fishing area 29: Stock status and update for 2005

Zone de pêche du pétoncle 29 : état du stock et mise à jour pour 2005

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Abstract

There has been a regulated scallop fishery with TACs in the western portion of Scallop Fishing area 29 since 2001. Prior to 2004, area 29D had been closed to fishing because of the large number of young scallops in the area. The western half of area D was opened for the 2004 season after it was determined from the 2003 survey that there were enough commercial size scallops for a fishery. The eastern half of area D remained closed because most of the scallops there were smaller than 110 mm shell height. Based on the 2004 joint industry/DFO post-season survey, a reduction in TAC was recommended for areas B and D for the fishery in 2005. Scallops in the eastern half of area D are now large enough to harvest and all of area D should be available to the fishery in 2005.

Resumé

Il existe une pêche réglementée du pétoncle comportant des TAC dans la partie ouest de la zone de pêche 29 du pétoncle depuis 2001. Avant 2004, la pêche était interdite dans la zone 29D en raison du grand nombre de jeunes pétoncles qui s'y trouvaient. Elle a été autorisée pour la saison de 2004 dans la moitié ouest de la zone D, après que le relevé réalisé en 2003 ait permis de déterminer qu'il y avait l'a suffisamment de pétoncles de taille marchande. La moitié est de la zone D est demeurée fermée, car la plupart des pétoncles y avaient une hauteur de coquille inférieure à 110 mm. D'après le relevé d'après-saison réalisé en commun par l'industrie et le MPO en 2004, une réduction du TAC pour 2005 a été recommandée dans les zones B et D. Les pétoncles de la moitié est de la zone D sont maintenant suffisamment gros pour être exploités, de sorte que la pêche devrait être autorisée dans toute la zone D en 2005.

Introduction

Scallop Fishing area (SFA) 29 encompasses a very large inshore area inside the 12-mile territorial sea, from the south of Yarmouth (latitude 43° 40′N) to Cape North in Cape Breton. This report refers to only that portion of SFA 29 west of longitude 65° 30′W continuing north to SPA 3 at latitude 43° 40′N. Prior to 1986, the Full Bay Scallop fleet had fished in this area. Following the 1986 inshore/offshore scallop fishing agreement, fishing by the Full Bay fleet was restricted to north of latitude 43° 40′N.

A limited fishery by the Full Bay fleet was granted from 1996–98. Access was again granted to this fleet in 2001 with a full at-sea monitoring program, and with a condition of a post-season industry funded survey. Scallop fishers had consulted with lobster fishers in the area to deal with potential conflicts. Lobster bycatch was minimal in 2001 despite high scallop catch rates. Lobster bycatch continues to be monitored in this fishery.

In 2002, the Minister approved access to this area by the Full Bay fleet and inshore east of Baccaro licence holders who are authorized to fish in SFA 29 west of longitude 65° 30′W. SFA 29 inshore scallop licenses were historically restricted to east of Baccaro (east of longitude 65° 30′W). A joint project agreement was signed by the fishing fleets, Natural Resources Canada and Department of Fisheries and Oceans with all parties providing funds to conduct multi-beam acoustic mapping of the seafloor and other scientific work. A map showing bottom features for the entire area was prepared and distributed to the fishermen for the 2004 fishery. Analysis of surficial geology and the spatial distribution of scallops is ongoing.

The opening of the 2003 fishery was delayed from the beginning of June until the end of July with area B closing 22 August due to high lobster bycatch. Fisheries management opened area E in the latter part of the season and the whole fishery was closed on 12 September. In 2004, the fishery opened on 14 June and continued until 31 July. Prior to 2004, area D had been closed to fishing because of the large number of young scallops in the area. The western half of area D (west of longitude 65° 40′ W) was opened for the 2004 season after it was determined from the 2003 survey that there were enough commercial size scallops for a fishery. The eastern half of area D remained closed because most of the scallops there were smaller than 110 mm shell height.

This report summarizes commercial fishery, research survey and observer data up to and including 2004 and presents scientific advice for the 2005 fishery. The previous research document on this fishery was Smith et al. (2003).

Commercial fishery

The commercial fishery is directly monitored by satellite-based vessel monitoring systems (VMS), hails in and out, commercial fishing logs and dockside monitoring. The dockside monitoring program also conducts meat weight sampling of the commercial landings.

The TAC for the 2004 fishery had been set at 600 t. This increase over the TAC in 2003 (452 t) was mainly due to the addition of the western portion of area D to the fishery. Total landings in 2004 were 511 t (Table 1).

Commercial catch rates for 2004 are presented by fleet, area and month in Table 2. The highest catch rates occurred in each area in June with area A and D being the highest overall. High catch rates exhibited spatial clustering in the different areas with the higher catch rates in area A mainly near the 12 mile boundary, in B on the inshore side, and on the eastern end of the open portion of D (Fig. 1). Over the last four years catch rates have declined in areas B and C, while remaining stable or increasing in area A (Fig. 2).

Meat weight sampling of the commercial catch was more extensive in 2004 than in 2003 and for the first time, samples were obtained from East of Baccaro vessels (Table 3). Average meat weights in area B were higher than last year while they were lower in area C. Percentages of small meats (less than 8 g) were extremely low.

Research survey

Research surveys of the whole area after the fishing season have been conducted using commercial fishing vessels since 2001. The vessels used nine miracle drags with 75–78 mm inside diameter rings knitted together with steel washers and with offshore chafing rubbers. Note that steel washers were not used for the 2001 survey. Drag number 1 was lined with 38 mm polypropylene mesh to retain the smaller scallops. The catch in the two end drags (numbers 1 and 9) were sampled on each tow. Sampling and measurements were conducted as per standard scallop research survey protocols (Smith and Lundy 2002).

From 2002 to present, additional stations have been added to the survey for exploratory purposes. However, survey abundance estimates are based only on the random stations allocated to areas A to E. Exploratory tows in all areas (including E) are included on the maps and data from these tows will be analyzed in conjunction with the multibeam bathymetry and surficial geology data once they are available.

Note that the 2001 to 2003 surveys were conducted by the F/V Julie Ann Joan while the 2004 survey was done by the F/V Branntelle. Comparative towing experiments were not conducted between the two vessels and differences in fishing power between them are unknown. However, the same type of gear and fishing practices were used throughout the four years on the two different vessels. In addition, the spatial distribution of the scallops observed in 2004 survey appeared to be consistent with patterns noted in previous years. For the time being, pending further investigation, all four years of the survey will be used to interpret trends for this fishery.

In 2004, mean numbers per tow have declined in all areas for all size classes since 2003 (Table 4). The highest concentrations of commercial size animals (110+ mm) occurred in the central portion of area D and the northern area of C (Fig. 3). Scallops with shell height 80 to 110 mm remained abundant in area D and C relative to the other areas (Fig. 4).

The highest concentrations of scallops less than 80 mm were in area D with some parts of area B and D having high densities of scallops less 65 mm (Figs 5 and 6).

Clappers (paired empty shells) are used as an indicator of natural mortality. These were found in low densities in most areas with the highest concentrations in the northern portion of area D (Fig. 7).

Based upon the survey recruitment continues to be low in area A, while the survey biomass index for commercial size animals ($\geq$ 110 mm) appears to be stable (Fig. 8). Recruitment has declined in area B since 2001 and the survey biomass index for commercial size animals has declined by 57 percent since 2002 (Fig. 9). A large decline in the survey biomass index for commercial size scallops in area C occurred from 2001 to 2002 (after the 2002 fishery) but this index has remained stable since 2002 (Fig. 10). Recruitment in area C has increased slightly since 2001.

Area D was unfished prior to 2004 and all size classes exhibited increases in biomass up to 2003 (Fig. 11). After the 2004 fishery all size classes showed declines. However, in the survey area east of 65°40′ W where fishing did not occur, commercial size scallops and recruits continued to increase (Fig. 12). The biomass index for commercial size scallops in the fished portion of the survey dropped by 89 percent between 2003 and 2004.

Total mortality estimates were calculated using the survey size and growth data (Fig. 13. Animals with shell heights 100 to 109 will grow by 10 mm in one year and were considered recruits while scallops with shell heights greater than or equal to 110 mm were defined as fully-recruited for these estimates. Area D appeared to have the highest exploitation in 2004 relative to other areas as would be expected given the 89 percent decline in the survey index for the fished area (Table 5).

Lobster bycatch

The potential impact of this scallop fishery on the lobster population in the area is monitored by observers and by the scallop research survey. The regular monitoring by onboard observers of lobster bycatch from this fishery is unique relative to other scallop fisheries. Observer coverage was required for both fleets and consists of one observed trip per vessel. In 2004 observer coverage accounted for 15 percent of the landed weight of scallops.

Area B continued to be an area with high bycatch of lobster during the fishery, especially injured and dead animals (Table 6, Fig. 14). The number of lobsters caught relative to the concurrent catch of scallops was adjusted to the total scallop catch in each area to estimate a total of 3208 lobsters caught during the commercial fishery (Table 7). Of those caught in all areas, 3 percent were dead and 13 percent were injured. These estimates assume that observations from observed trips are representative of non-observed trips. All lobsters caught in the fishery were required to be returned to the water.

The estimated rate of lobster catch for all areas was 6.3 lobsters per ton of scallop in 2004. In 2002 when catches from area B were much higher, the catch rate was 10 lobsters per ton of scallop.

The mean catch of lobster in the 2004 survey of areas A to E (4.2 per tow) was 1.5 times that of the 2003 survey (2.7 per tow). Most lobsters were caught in areas A and B (Fig. 15). More exploratory survey tows were completed in the area above C in 2004 and lobster catches there were much higher than in the regular survey area (9.0 per tow).

Stock status and advice for 2005

Recruitment (shell height 80 to 110 mm) to the fishery appears to be available in areas C and D only. Based upon growth analysis completed to date, this size range is comprised primarily of scallops ages 4 to 6. The average meat weight of 5 year old animals was 15.2 g which corresponds to the regulated meat count of 33/500 g for this area.

Very few scallops with shell heights less than 105 mm were found by the survey in area A. While a catch of 80 t in 2004 did not seem to result in a large decline in survey biomass, continued fishing in this area in 2005 will probably be limited to scallops ages 6 and older because of the lack of younger animals.

Survey biomass indices of commercial size scallops indicate that the 2004 catch level of 80 t will be excessive for area B in 2005 given the lack of recruitment.

Survey biomass indices of commercial size scallops in area C appear to be stable at a catch of 160 t in 2004.

Landings of 188 t in area D had a larger than expected effect on the survey indices which indicated a decline of 89 percent in biomass in the fished area. Recruitment in area D is expected in 2005 and 2006, and the prospects for future years will have to be evaluated after the 2005 and 2006 surveys. While the area to the east of 65°40′ W can be open to fishing in 2005, a lower TAC is recommended for the entire area of D. Areas C and D are of comparable size and the current survey index for recruited scallops (110+ mm) in area D is about 1/3 of that in area C . Based on this comparison, a TAC of 55 t (approximately 160/3) is recommended for area D in 2005.

There was not enough survey information to recommend catch levels for area E. The 2004 survey indicates that this area is marginal habitat for scallops.

Acknowledgements

We thank the Captain (Kevin Ross) and crew of F/V Julie Ann Joan, and Captain (Vance Hazelton) and crew of F/V Branntelle for their contributions to maintaining the survey series for Scallop Fishing Area 29. John Tremblay and Jae Choi provided very helpful comments on the stock assessment.

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Table 1. Scallop landings for Scallop Fishing Area 29. Landings by area in 2001 determined from log records and 18 t could not be assigned to areas A to E and is labelled as 29U. In 2004 one TAC was set for areas A, B and E combined.

		Full Bay		East of Baccaro		Total	
Year	Area	TAC (t)	Landings (t)	TAC (t)	Landings (t)	TAC (t)	Landings (t)
2001	29A		(2)				
	29B		(71)				
	29C		(309)				
	29U		(18)				
	Total	400	400			400	400
2002	29A	75	1	25	4	100	5
	29B	150	193	50	75	200	268
	29C	375	334	125	106	500	440
	Total	600	528	200	185	800	713
2003	29A						
	29B	150	114	51	38	201	152
	29C	188	33	63	32	251	65
	29E		2		2		4
	Total	338	149	114	72	452	221
2004	29A	150.0	70.2	50.0	9.9	200	80.1
	29B		33.1		46.8		79.9
	29E		0.2		3.4		3.6
	29C	187.5	123.8	62.5	35.2	250	159.0
	29D	112.5	148.6	37.5	40.0	150	188.6
	Total	450.0	375.9	150.0	135.3	600	511.2

Table 2. Catch rate (kg/h) by month, area and fleet for Scallop Fishing Area 29 in 2004. Note that fishery was closed July 31 2004.

Fleet	June	July	Aug	Sept	All
All Areas					
Full Bay	68.1	41.1			54.4
E. Baccaro	42.0	26.5	41.9		32.0
Area A					
Full Bay	87.0	49.6			64.7
E. Baccaro	33.3	29.0			30.5
Area B					
Full Bay	39.7	34.6			35.7
E. Baccaro	32.0	30.1			30.44
Area C					
Full Bay	55.8	40.7			46.0
E. Baccaro	31.7	24.0	41.9		26.1
Area D					
Full Bay	73.8	40.7			70.1
E. Baccaro	55.2	16.5			44.4
Area E					
Full Bay		46.24			46.24
E. Baccaro					

Table 3. Statistics from meat weight samples of scallop vessels in Scallop Fishing Area 29 for the 2004 fishing season. All samples collected by an industry supported dockside monitoring program. Statistics on the percentage by number of meats in the sample that were less than 8 g are also given.

		Meat Weight (g)			Count	Number of	Percent < 8 g		
Month	N	Mean	Min.	Max.	per 500 g.	Samples	Mean	Min.	Max.
29A									
					Full Bay				
June	203	15.3	7.7	56.6	33.5	3	0.5	0.0	1.4
July	420	14.9	6.1	36.6	34.7	6	2.4	0.0	6.6
					East of Baccaro				
July	39	22.6	14.4	33.1	22.1	1	0.0	0.0	0.0
29B									
					Full Bay				
June	98	21.5	10.4	43.9	23.9	2	0.0	0.0	0.0
July	204	20.4	7.9	33.3	24.8	4	0.6	0.0	1.7
					East of Baccaro				
July	55	17.7	9.2	27.7	28.3	1	0.0	0.0	0.0
29C									
					Full Bay				
June	265	19.9	8.0	39.5	25.7	5	0.0	0.0	0.0
July	499	21.0	7.3	57.3	24.6	10	0.0	0.0	0.0
					East of Baccaro				
July	101	20.4	8.8	36.0	24.8	2	0.0	0.0	0.0
29D									
					Full Bay				
June	835	21.8	7.1	40.8	23.7	17	0.2	0.0	2.2

Table 4. Mean numbers per tow for scallop surveys in Scallop Fishing Area 29. The mean numbers per tow of clappers are shown in brackets.

		Shell Height (mm)				
Area	Year	< 65	65–80	80–109	≥ 110	No. of tows
29A	2001	4.7 (0.5)	1.5 (0.0)	164.2 (76.6)	136.6 (20.7)	18
	2002	0.5 (0.0)	0.0 (0.0)	27.1 (14.7)	95.5 (14.4)	20
	2003	11.8 (0.0)	1.5 (0.0)	33.1 (17.2)	177.2 (41.9)	7
	2004	2.2 (1.4)	0.0 (0.0)	1.4 (0.0)	89.8 (8.5)	15
29B	2001	26.1 (0.7)	10.8 (0.2)	100.2 (7.8)	163.8 (11.6)	48
	2002	21.6 (0.9)	15.9 (0.2)	81.2 (29.8)	318.2 (8.4)	54
	2003	25.0 (0.2)	19.1 (0.8)	52.6 (5.3)	255.5 (31.0)	40
	2004	16.9 (0.2)	7.2 (0.0)	23.2 (1.7)	125.2 (7.1)	43
29C	2001	46.8 (1.1)	23.8 (0.4)	69.3 (6.1)	457.1 (36.9)	23
	2002	73.8 (5.4)	63.6 (4.6)	165.1 (35.0)	196.1 (53.1)	24
	2003	35.3 (3.6)	32.1 (8.1)	204.1 (17.3)	192.2 (36.6)	22
	2004	12.3 (0.0)	10.6 (0.0)	140.2 (6.1)	147.5 (18.1)	19
29D	2001	135.7 (1.0)	11.8 (0.0)	7.4 (0.9)	50.2 (3.5)	19
	2002	64.7 (6.5)	40.6 (1.7)	29.3 (13.4)	104.0 (42.1)	27
	2003	96.0 (4.9)	276.8 (5.9)	368.1 (27.5)	149.5 (45.3)	24
	2004	16.0 (0.0)	25.8 (2.5)	178.9 (32.1)	54.9 (7.3)	22

Table 5. Total mortality estimates from survey numbers of scallops with shell heights ≥ 100 mm in year t with numbers of scallops with shell heights ≥ 110 mm in year $t+1$.

	Area				
Year	A	B	C	D	Comments
2002	0.98	−0.36	0.96	−0.65	No fishing in D, 5 t in B.
2003	−0.43	0.39	0.22	−0.28	No fishing in D or A.
2004	0.82	0.82	0.58	1.37	Eastern half of D closed.

Table 6. Numbers of lobsters recorded by observers and notes on condition for 2004.

Area	Alive		Dead	N/A	Grand Total
	Injured	No Injury			
A	3	10	0	0	13
B	61	415	15	9	500
C	5	41	1	0	47
D		2	1	0	3
E	4	16		0	20
Grand Total	73	484	17	9	583

Table 7. Estimated total numbers of lobsters caught in the scallop fishery for 2004.

Area	Observer data		Fishery	Estimated
	No. Lobsters	Meats (t)	Meats (t)	No. Lobsters
A	20	12.4	80.1	129
B	623	26.4	81.9	1934
C	94	25.3	158.0	588
D	5	11.0	188.6	86
E	20	0.2	3.6	471
Total	762	75.2	512.2	3208

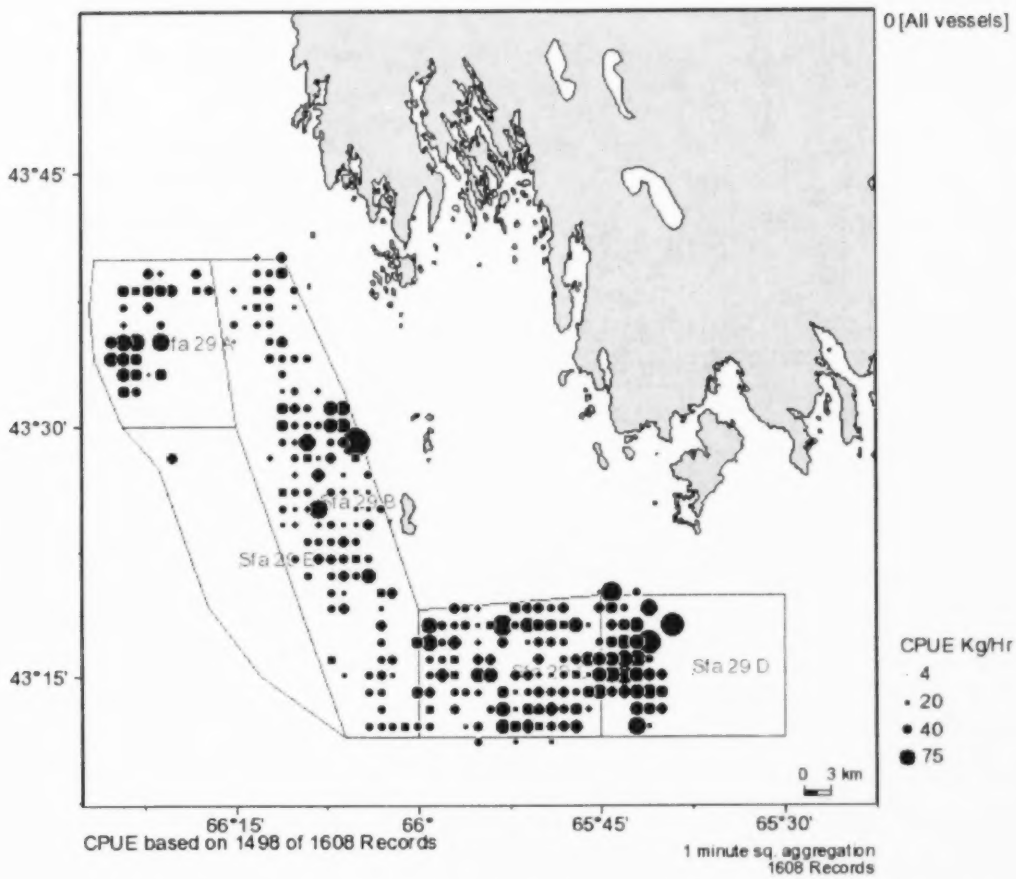

Fig. 1. Spatial distribution of catch rates (kg/h) for both fleets during the 2004 scallop fishery in Scallop Fishing Area 29.

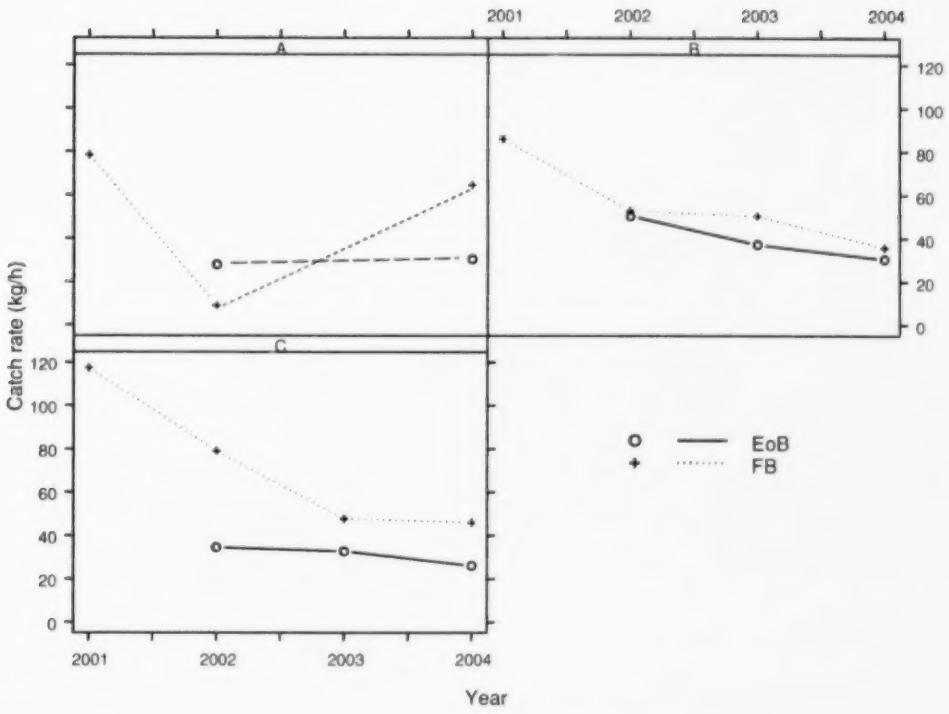

Fig. 2. Commercial catch rate (kg/h) trends for SFA 29 scallop fishery in each of the areas (A, B and C).

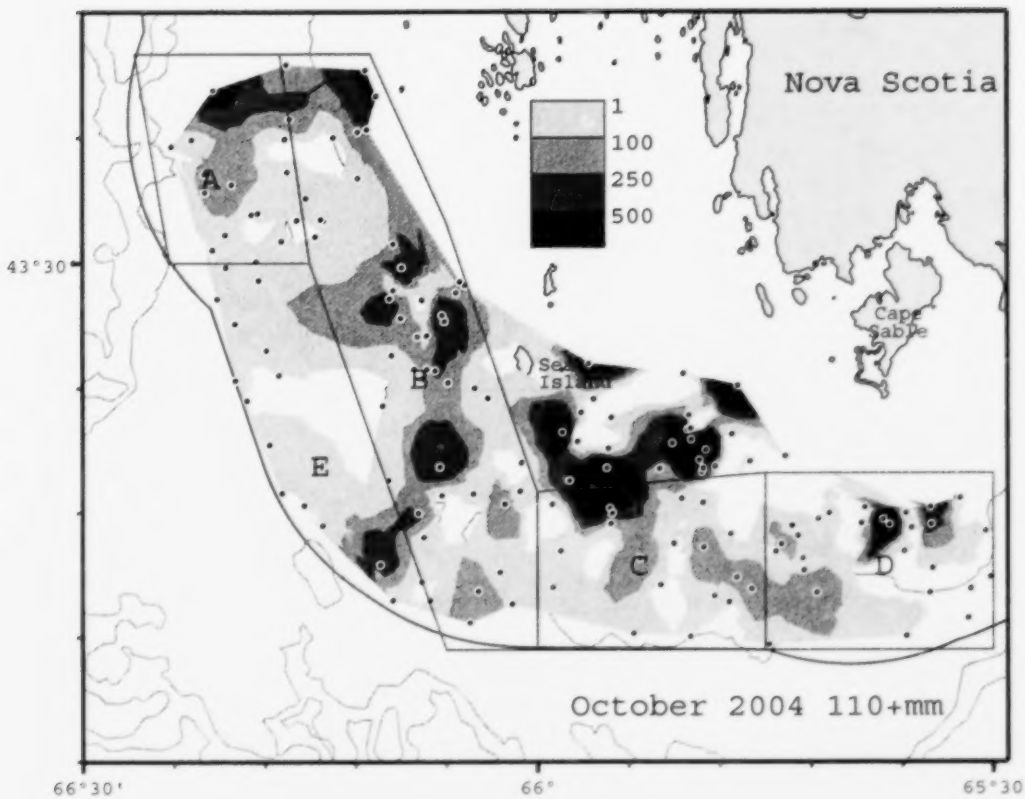

Fig. 3. Spatial distribution of scallops for shell heights 110 mm and larger caught during the 2004 research survey with the FV Branntelle in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

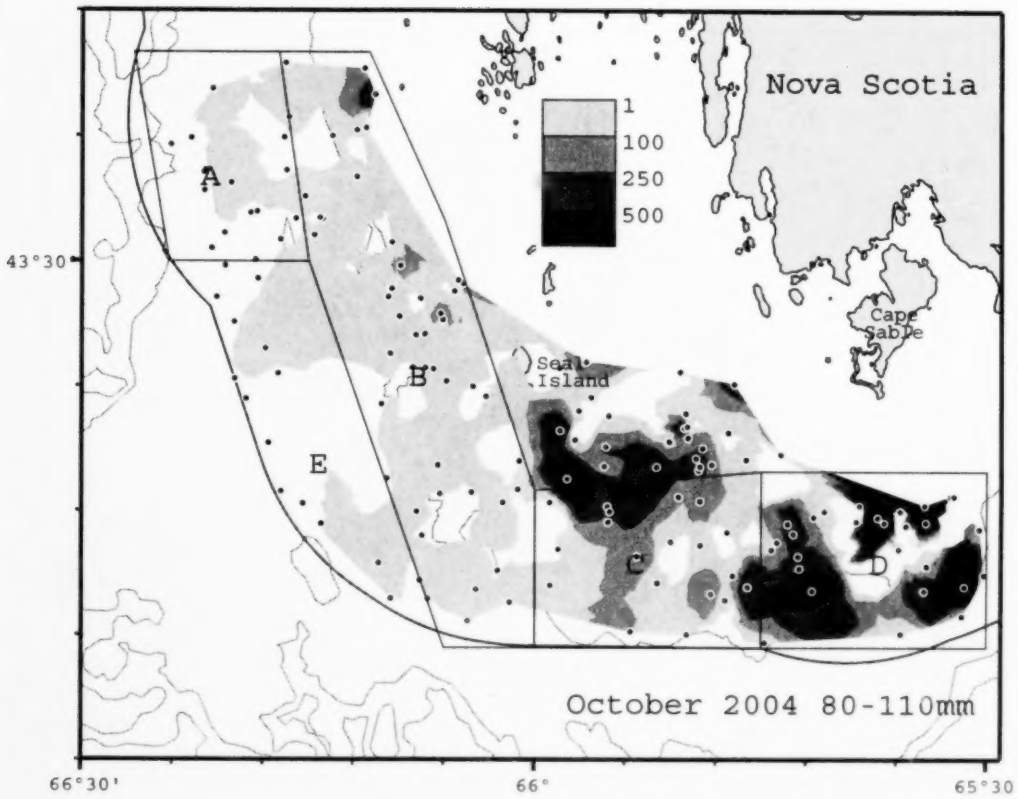

Fig. 4. Spatial distribution of scallops for shell heights from 80 to 110 mm caught during the 2004 research survey with the FV Branntelle in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

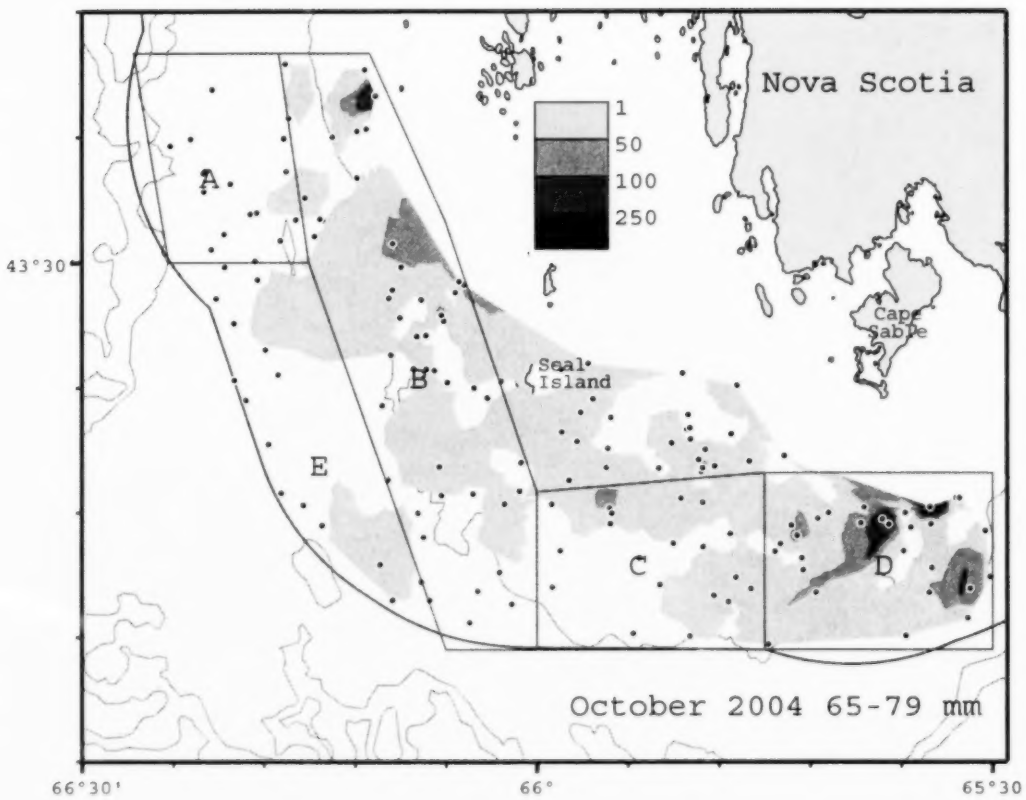

Fig. 5. Spatial distribution of scallops for shell heights from 65 to 79 mm caught during the 2004 research survey with the FV Branntelle in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

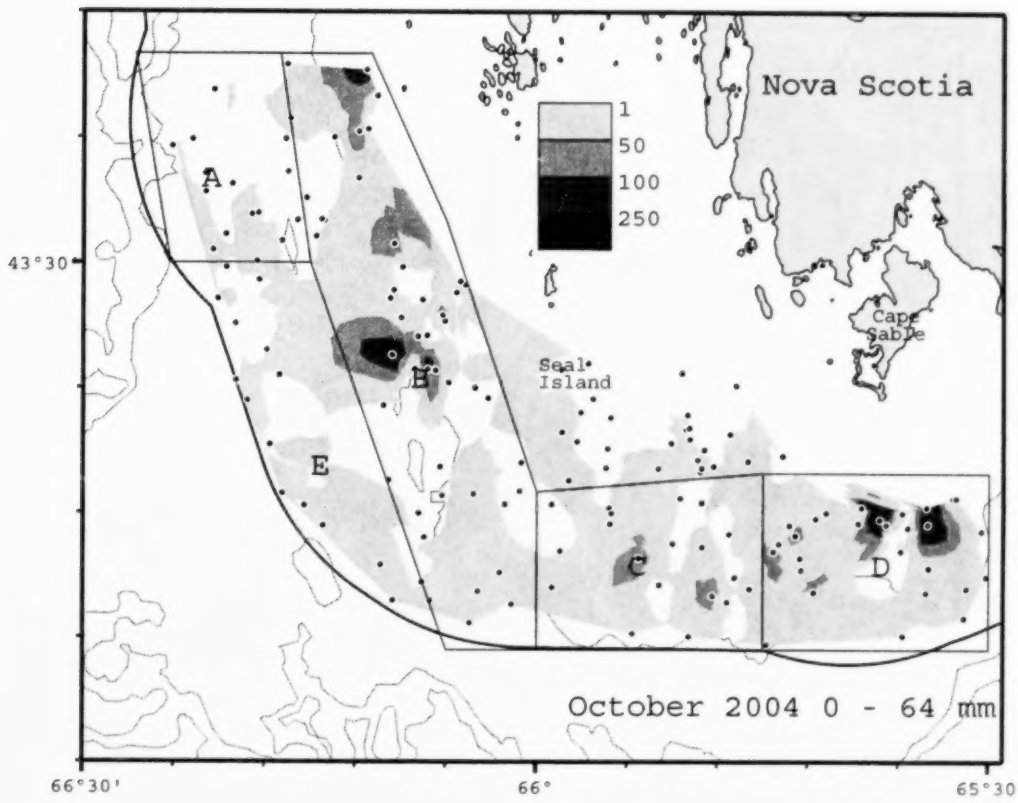

Fig. 6. Spatial distribution of scallops for shell heights less than 65 mm caught during the 2004 research survey with the FV Branntelle in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

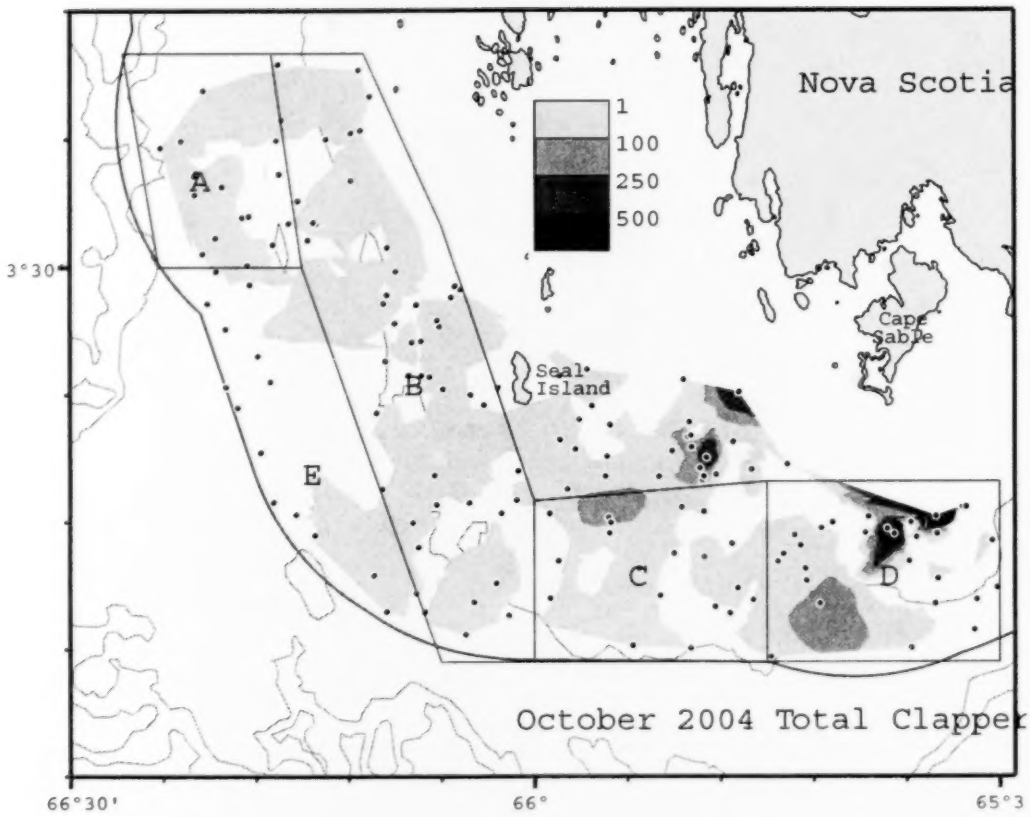

Fig. 7. Spatial distribution of clappers for all sizes caught during the 2004 research survey with the FV Branntelle in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of clappers per standard tow. Dots depict tow locations.

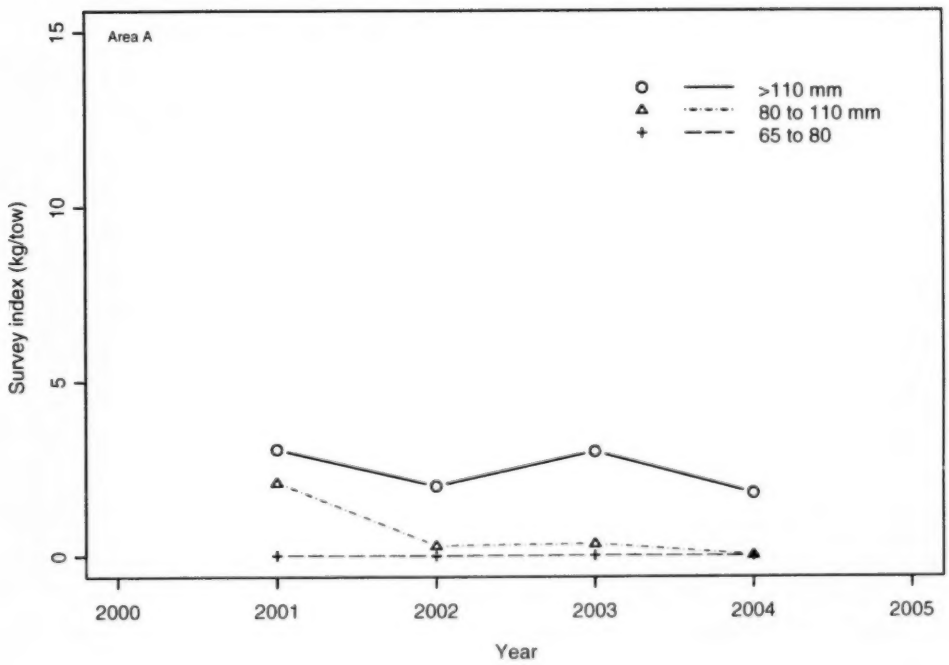

Fig. 8. Annual trends by size class for scallop survey biomass index (kg/tow) in Area 29A.

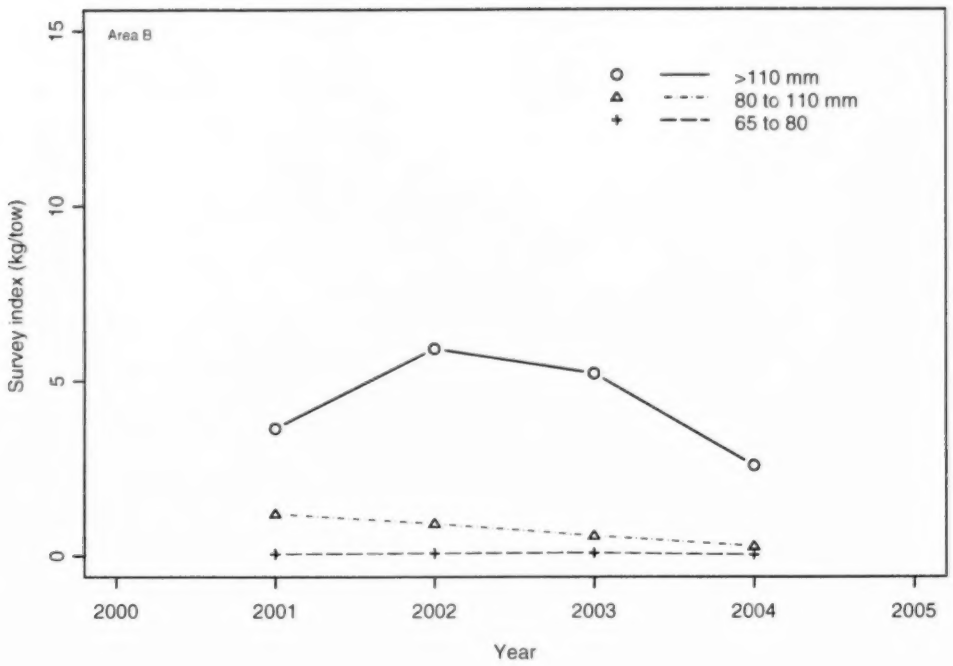

Fig. 9. Annual trends by size class for scallop survey biomass index (kg/tow) in Area 29B.

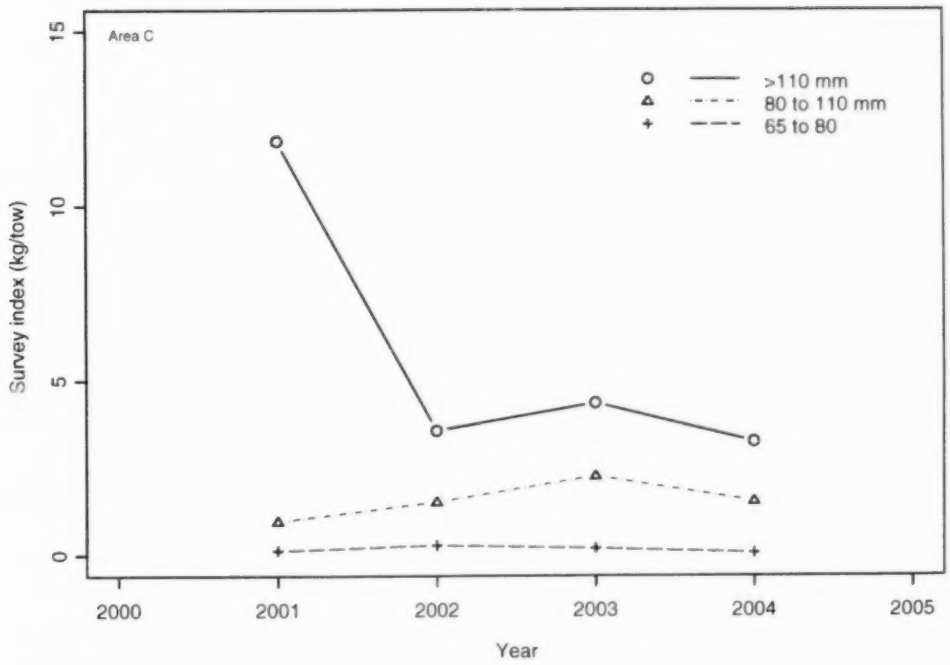

Fig. 10. Annual trends by size class for scallop survey biomass index (kg/tow) in Area 29C.

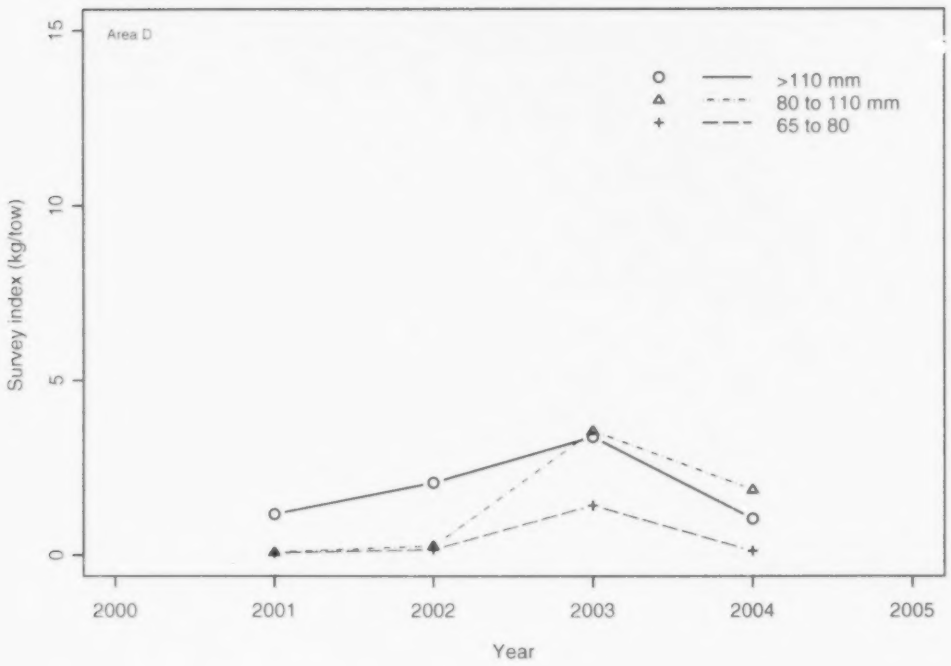

Fig. 11. Annual trends by size class for scallop survey biomass index (kg/tow) in Area 29D.

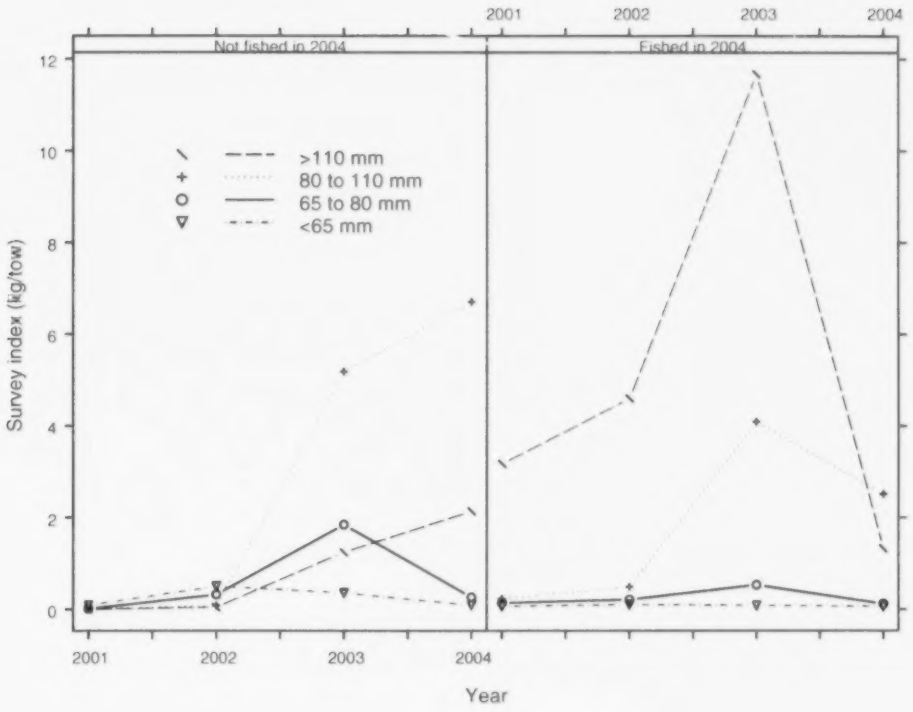

Fig. 12. Annual trends by size class for scallop survey biomass index (kg/tow) in area 29D. Left panel corresponds to survey area east of 65°40′ W and right panel corresponds to west of 65°40′ W.

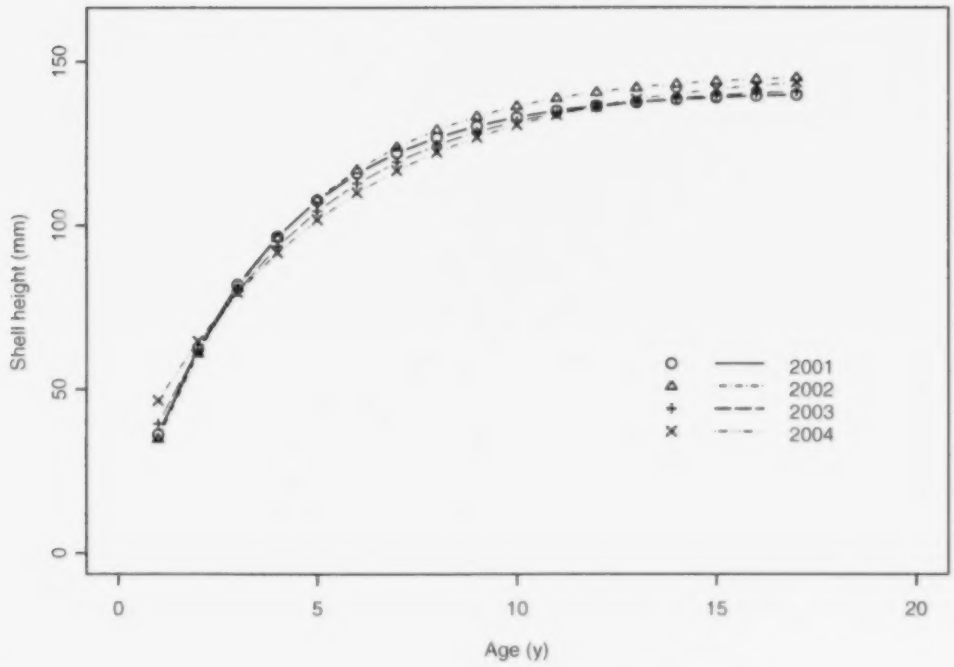

Fig. 13. Von Bertalanffy growth curves for Scallop Fishing Area 29.

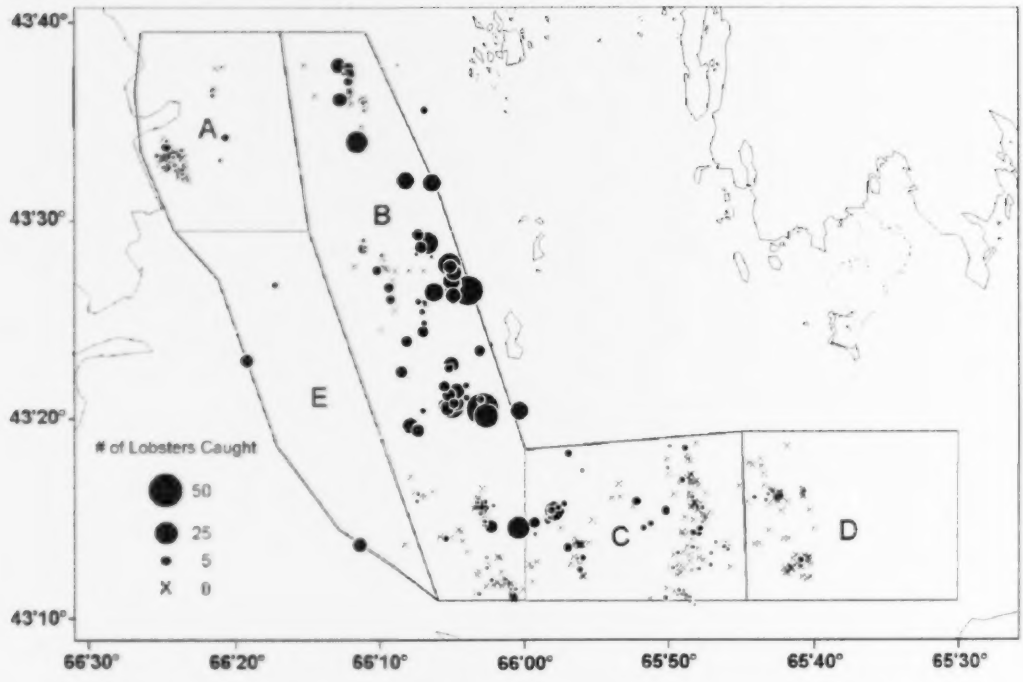

Fig. 14. Location and numbers of lobsters caught per tow in Scallop Fishing Area 29 in 2004 from observed scallop fishing trips.

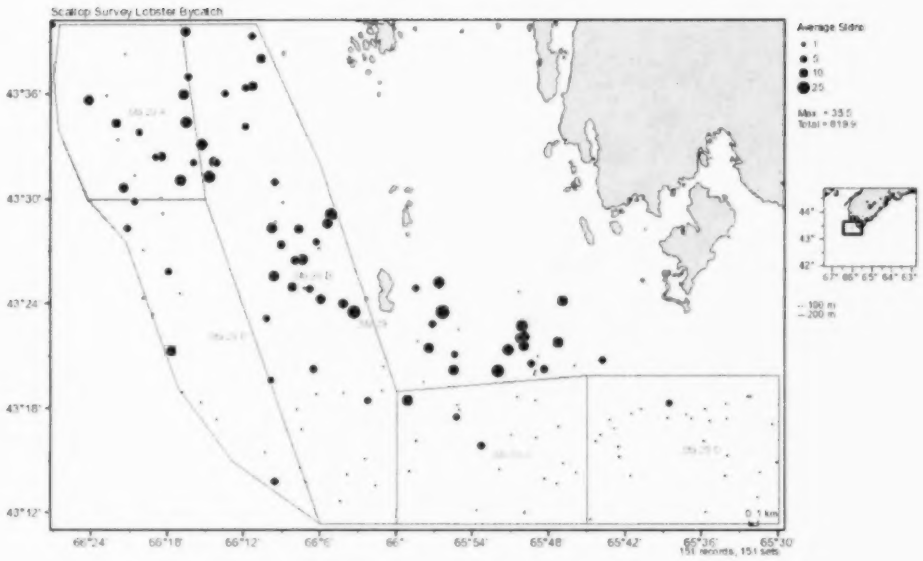

Fig. 15. Location and catch of lobsters during the 2004 research survey of Scallop Fishing Area 29.